

Sylhet Cadet College
Progress Test Examination - 2023
Class: HSC

Subject: Statistics Second Paper (Creative) **Set: A**
Time: 2 hour & 35 minutes **Subject Code: 130**

Full Marks: 50

Answer FIVE questions taking at least two (2) from each group. Figures in the right indicate full marks.

Group A

1. An unbiased coin is tossed 10 times.

- (a) If a coin is flung 3 times, how many outcomes are generated? 1
- (b) If a coin is flung n times, show how many outcomes are generated. 2
- (c) What is the probability of getting a) at least 3 heads, b) at most 3 heads? 3
- (d) Are these probabilities equal? a) Getting at least 2 heads & b) Getting at least 2 tails. Also justify logically. 4

2. The probability distribution of a discrete random variable X is given below:

x	-2	-1	0	1	3	4
P(x)	0.1	k	2k	3k	4k	0.2

- (a) What is $\Sigma P(x)$? 1
- (b) Find the value of k. 2
- (c) Find $P(X \geq 0)$ and $P(X < 1)$. 3
- (d) Find the cumulative distribution function, F(X) and F(2) and explain. 4

3. The probability distributions of demand of mobile phones of two operating systems (OS) Android (X) and iPhone (Y) are:

Demand	100	200	300	400	500
P(X)	0.1	0.4	m	0.15	0.1
P(Y)	0.09	0.45	0.32	0.11	0.03

- (a) What is Expectation? 1
- (b) Can Expectation be negative? 2
- (c) Find m from the table. 3
- (d) Which OS has higher demand? Analyze. 4

4. An umbrella seller earns a revenue of BDT. 5000 if it rains. If it does not rain, he loses BDT. 1000. The probability that it rains on a given day is 0.04.

- (a) Write down the formula of Expectation for a continuous random variable. 1
- (b) Can the value of Expectation be zero? 2
- (c) What is the umbrella seller's expected revenue? 3
- (d) What should be the minimum probability of raining for him to achieve revenue greater than zero? 4

Group B

5. The number of defective pen produced by a company follows a binomial distribution with expectation 1.5 and variance 1.125..

- (a) What is the mean of binomial distribution 1
- (b) Can variance be greater than mean in binomial distribution? 2
- (c) Determine the probability function of the number of defective items produced by the company. 3
- (d) What is the probability that the number of defective items is no less than 3? 4

6. The number of customers coming at a shop per minute follows a Poisson distribution, whose mean is 3.

- (a) What is a Poisson variate? 1
- (b) Can the mean of Poisson distribution be negative? 2
- (c) Find the probability that the number of customers coming is between 1 and 2. 3
- (d) Are the probabilities of coming to 2 and 3 customers equal? 4

7. **A can manufacturer observes that 0.1% of the produced cans are faulty. The cans are packaged in carton boxes, with 500 cans in each box. A wholeseller purchases 100 boxes from the manufacturer.**
- (a) What is shape of Poisson distribution? 1
 - (b) For a Poisson distribution, $P(2) = P(3)$. What is $P(2)$? 2
 - (c) Find the probability of exactly one defective can. 3
 - (d) Find the expected number of boxes with no defective cans. 4
8. **A reseracher uses the following data to know about some demographic characterisics.**
- (a) What is General Fertility Rate? 1
 - (b) What is the difference between GRR and NRR? 2
 - (c) Compute the population density. 3
 - (d) Are TFR and GRR same for this data? 4